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(54) Title: SERVICING REQUESTS THAT ARE ISSUED IN A PROTOCOL OTHER THAN THE PROTOCOL EXPECTED BY THE SERVICE
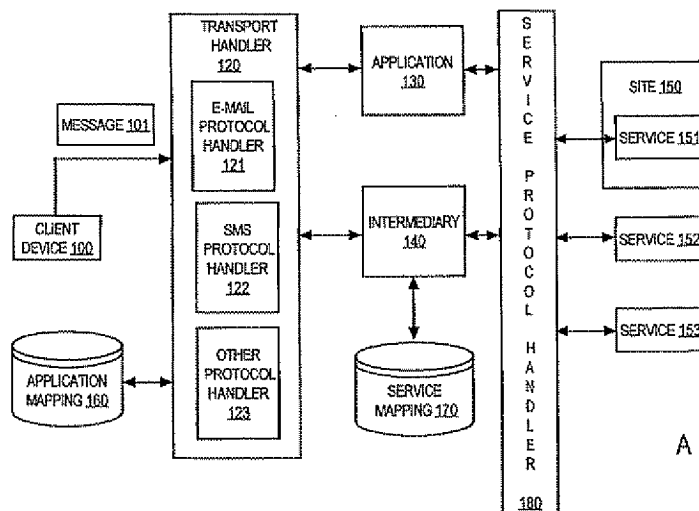
(57) Abstract: Techniques are provided for servicing requests that are issued in a protocol such as SMS or e-mail, other than the protocol, expected by the service, such as HTTP or Java API. For example, many people want to use their mobile devices to interact with services, which require the ability to have multiple related messages in a session. However, their mobile devices do not have protocols that support interacting with such services. One technique provided herein is to interpose an intermediary between the mobile devices and the services to provide session capabilities on behalf of the mobile devices. In one embodiment, a service returns a web page including menu items and/or hyperlinks. The menu items and hyperlinks are translated into descriptive text preceded by a user selectable reference number. The intermediary maintains a session context by saving the selected reference numbers.

SERVICING REQUESTS THAT ARE ISSUED IN A PROTOCOL OTHER THAN THE PROTOCOL EXPECTED BY THE SERVICE

PRIORITY CLAIM AND CROSS-REFERENCE TO RELATED APPLICATIONS

[0001]   This application is related to and claims domestic priority from prior U.S. Provisional Application Serial Number 60/337,359 (attorney docket number 50277-1866), filed on November 30, 2001, entitled "Realizing Session and Synchronous Semantics Based on Asynchronous Messaging Protocols", by Zhou Ye and Calvin Wang, the entire disclosure of which is hereby incorporated by reference for all purposes as if fully set forth herein.

FIELD OF THE INVENTION

[0002]   The present invention relates to providing requested information to users and more specifically to providing information to users with a protocol other than the protocol expected by the service that provides the information.

BACKGROUND OF THE INVENTION

[0003]   As the popularity of the Internet grows, more and more people are accessing the Internet with their mobile devices. Many of the applications that people access on the Internet are session based. Sessions allow for multiple requests and multiple responses to complete a task.

[0004]   Many of today's mobile devices that access the Internet are required to have a Web browser that communicates with session based web applications. Web browsers provide menus and hyperlinks for users to navigate through web applications (hereinafter referred to as "user navigation capabilities"). However, many people have mobile devices that do not have Web browsers. Instead these mobile devices typically use asynchronous protocols, such as e-mail and Short Message Service (SMS). Asynchronous protocols only allow for a single request, and a single response to that request, for a given task.

[0005]   Therefore it can clearly be seen that there is a need for providing web capabilities, such as sessions and user navigation capabilities, to mobile devices, which use a vast array of asynchronous protocols.

SUMMARY OF THE INVENTION

[0006]   Techniques are provided for servicing requests that are issued in a protocol other than the protocol expected by the service. For example, many people want to use their mobile devices to interact with services, which require the ability to have multiple related messages in a session. However, their mobile devices do not have protocols that support interacting with such services. One technique provided herein is to interpose an intermediary between the mobile devices and the services to provide session capabilities on behalf of the mobile devices.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]   The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

[0008]   FIG. 1A is a block diagram of a system used for servicing requests that are issued in a protocol other than the protocol expected by the service;

[0009]   FIG. 1B is a block diagram that shows a message in which the to-address corresponds to a site and the message content is used to locate a service within the site;

[0010]   FIG. 1C is a block diagram that shows a message in which the to-address corresponds to a specific service;

[0011]   FIG. 1D is a block diagram that shows a message in which the to-address corresponds to a particular application;

[0012]   FIG. 2 is a block diagram illustrating message flow between a client device, an intermediary, and a service; and

[0013]   FIG. 3 is a block diagram that illustrates a computer system upon which embodiments of the invention may be implemented.

DETAILED DESCRIPTION OF THE INVENTION

[0014]   A method for servicing requests that are issued in a protocol other than the protocol expected by the service is described, for the purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be apparent, however, that the present invention may be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form in order to avoid unnecessarily obscuring the present invention.

A SYSTEM OVERVIEW

[0015]   FIG. 1A is a block diagram of a system used for servicing requests that are issued in a protocol other than the protocol expected by the service. A client device 100 is used for requesting services with a message 101. The client device 100 transmits message 101 with an asynchronous protocol such as email or SMS. Message 101 contains a request for a service and contains information for locating the service (151, 152, or 153). In one case, a to-address in message 101 is used for locating a specific service. In another case, a to-address in message 101 is used for locating a site 150 and part of message 101's content is used for locating a specific service 151 within the site 150.

[0016]   A transport handler 120 encapsulates one or more asynchronous protocol handlers such as e-mail protocol handler 121, SMS protocol handler 122, and other protocol handlers 123. Each protocol handler (121, 122, 123) processes a particular type of asynchronous protocol. Therefore, transport handler 120 is capable of communicating with whatever asynchronous protocol that client device 100 uses. The protocol handler (121, 122, or 123) transmits the contents of message 101 to intermediary 140. According to one embodiment, message 101's content is in text (hereinafter referred to as "text formatted request").

[0017]   Intermediary 140 receives message 101's content from one of the protocol handlers (121, 122, 123), translates message 101's content into a format that the services (151, 152, or 153) understands, forwards the request to the service (151, 152, or 153), and maintains session context as will be described in more detail. For example, message 101's content is used (1) to fill in fields of a web page or (2) to select a hyperlink, as will be described in more detail. According to one embodiment, the filled in web page is in Oracle's mobile XML™.

[0018]   The service protocol handler 180 provides web protocols such as Hyper Text Transfer Protocol (HTTP). According to one embodiment, the service protocol handler 180 is provided by an Internet Service Provider (ISP). According to another embodiment, the service protocol handler 180 is a Java API that is used to register services (151, 152, 153). A service (151, 152, or 153) provides information in response to message 101. According to one embodiment, the response to message 101 is a web page. For example, the response to message 101 maybe in Oracle's mobile XML™. Service 151 is on Site 150.

[0019]   Application mapping 160 contains an address-to-application mapping where valid to-addresses are mapped to applications (130, 140). An application (130 or 140)

listens for specific to-addresses by registering the to-addresses with the transport handler 120. Registering the to-addresses creates mapping entries in the application mapping 160. For example, when intermediary 140 registers a particular to-address, an entry is created in application mapping 160 that maps the particular to-address to intermediary 140.

[0020]   According to one embodiment, service mapping 170 maps the message 101's to-address to a specific service. According to another embodiment, service mapping 170 maps the message 101's to-address plus part of message 101's content to a specific service 151 within the site 150. These embodiments are described in more detail hereinafter.

AN OPERATIONAL EXAMPLE

[0021]   A person enters an email message 101 on client device 100. Message 101 contains a to-address that specifies service 152. Message 101 is intercepted by the transport handler 120. Since message 101 is an email, the e-mail protocol handler 121 receives message 101 from client 100, uses message 101's to-address to locate an entry in application mapping 160, and uses the entry to determine which application (130 or 140) to forward the message 100 to. Assuming the entry maps to intermediary 140, the e-mail protocol handler 121 forwards message 100 to intermediary 140. Intermediary 140 uses the message 100's to-address or the message 100's to-address plus part of message 100's contents to locate an entry in the service mapping 170. The entry in the service mapping 170 is used to determine which service (151, 152, or 152) the contents of message 101 are to be forwarded to. Assuming that service 152 expects requests in the form of a filled out web page, intermediary 140 uses the contents of message 101 to fill out the web page, communicates the filled out web page to service 152, and maintains session context as will be described in more detail hereinafter. Assuming that service 152 expects to receive requests using the HTTP protocol, service protocol handler 140 intercepts the filled out web page and transmits it to service 152 using HTTP. Then service 152 transmits a response and the process is reversed.

ADDRESSING CONSIDERATIONS

[0022]   FIG. 1B is a block diagram that shows a message in which the to-address corresponds to a site and the message content is used to locate a service within the site. The message 101 designates a to-address 102 and a message body. The to-address 102 is

int@y.com includes a site-wide address 106, y.com. For example, the site-wide address 106, y.com, corresponds to a site, not to a specific service.

[0023]   The message body contains an instruction 103. According to one embodiment, the instruction 103 has two parts – a short name 104 and a prompter 105. Instruction 103, "ST ORCL", specifies a particular service provided by the specified site and provides a parameter value related to that service. Specifically, the "ST" designates a stock quote service and "ORCL" designates that the stock is for Oracle.

[0024]   Intermediary 140 is an application that listens for the to-address 102, int@y.com. Site 150 is at the site-wide address 106, y.com. Service 151 is a stock service in site 150 at address y.com/finance/stock. Since the to-address 102 included a site-wide address 106, y.com, a short name 104, "ST", is used to designate a service 151 within the site 150. Intermediary 140 transmits the prompter 105, "ORCL", to service 151.

[0025]   If site-wide addressing is used with the SMS protocol, the to-address is a phone number like 1234567. Then phone number 1234567 designates the site 150. The short message 104, "ST", is used to designate the service 151 within site 150.

[0026]   FIG. 1C is a block diagram that shows a message in which the to-address corresponds to a specific service. The to-address 102 is stock@y.com. The service-level address 107 is also stock@y.com. The message body contains an instruction 103, "ORCL", to obtain a quote for Oracle stock. According to one embodiment, the instruction 103 has one part – prompter 105.

[0027]   Intermediary 140 listens for the to-address 102, stock@y.com. Service 151 is a stock quote service, which is at stock.y.com. Intermediary 140 transmits the prompter 105, "ORCL", to service 151.

[0028]   FIG. 1D is a block diagram that shows a message in which the to-address corresponds to a particular application. The to-address 102 is int@int.com. The to-address 102 includes an application address 108, int.com.

[0029]   Intermediary 140 listens for the to-address 102, int@int.com. Intermediary 140 is at the application address 108, int.com. Intermediary 140 uses the short name 104, "ST", to determine the service address of service 151. In this example, service 151 can be contacted by the intermediary using either site-wide addressing, y.com/finance/stock, or service-level addressing, stock.y.com. Intermediary 140 transmits the prompter 105, "ORCL", to service 151. Although these examples describe transmitting the prompter 105 to the service 151, other items may be transmitted in addition to or instead of the prompter 105.

USER NAVIGATION CAPABILITIES AND SESSIONS

[0030]   FIG. 2 is a block diagram illustrating message flow between a client device, an intermediary, and a service. According to one embodiment, a person can request information from a service that returns a web page. The web page may include menu items and/or hyperlinks (hereinafter referred to as "web formatted response"). According to one embodiment, the menu items and the hyperlinks are translated into text format for display on the mobile device. This is accomplished by translating the menu items and hyperlinks into descriptive text preceded by a user selectable reference number.

[0031]   The reference numbers preceeding the descriptive text connect menus in a menu tree. As the user traverses the menu tree by selecting reference numbers, intermediary 140 maintains a session context by saving the selected reference numbers. Therefore, intermediary 140 has knowledge of where the user currently is in the menu tree. According to one embodiment, the session context is maintained as a part of a state machine.

[0032]   According to one embodiment, the session context is stored and maintained by intermediary 140. When intermediary 140 receives a request from a client device 100, intermediary 140 inspects the device ID associated with the request. If a session context does not already exist for that device ID, intermediary 140 creates a session context. According to one embodiment, the session context includes the device ID of client device 100, reference numbers the user selects, and the web formatted response. The session context is released when the session ends.

[0033]   According to one embodiment, the session is terminated when a timer runs out. According to a second embodiment, the session context is used to determine when to terminate the session. For example, the session is terminated when the session context indicates that the user has exited the service. According to a third embodiment, both the session context and a timer are used to determine when to terminate the session depending on which condition occurs first. For example, the session ends at the earliest of a timer ending or the user exiting the menu tree.

[0034]   Menu 204 and menu 208 below illustrate a menu tree where selecting the reference number 2 on menu 204 results in menu 208 being displayed to the user. For example, a user may request addresses of eating establishments nearest the user's home by entering a to-address 102, info@oraclemobile.com, and an instruction 103, "yp eating_establishments home" (hereinafter referred to as the "initial request in text 201"). The short name "yp" stands for Yellow Pages and the "home" parameter indicates that the eating establishments should be close to the user's home.

[0035]   The user's initial request in text 201 is transmitted to a service (151, 152, or 153). FIGS. 1B, 1C, and 1D are also examples of initial requests in text 201. The intermediary 140 intercepts the initial request in text 201 and uses its contents to create the initial request in web format 202. The service address is derived based on the to-address 102 in the initial request in text 201 as already described herein. The service 152 responds with a first web page 203. In this example, the first web page 203 has two hyperlinks: a first for fine restaurants and a second for burger joints. Intermediary 140 intercepts the first web page 203, associates the first web page 203 with the session context, translates the first web page 203 into a text formatted message, menu 204, and transmits the menu 204 to the client device 100. Menu 204 is displayed on the client device 100 as follows:

MENU 204
1 fine restaurants
2 burger joints

[0036]   The reference number "2" (205) is entered on the client device 100 as a request for a list of burger joints near the user's home area. Intermediary 140 saves the reference number "2" in the session context. Intermediary 140 translates the reference number "2" into a response the service 152 understands by using the first web page 203. For example, intermediary 140 translates the user selected reference number "2" into a selection of the second hyperlink, which is for burger joints, in the first web page 203. The selection of the second hyperlink 206 is communicated to the service 152. The service 152 responds with a second web page 207, which is a list of burger joints. The second web page 207 has four hyperlinks: a first for Burger King, a second for Carl's Junior, a third for McDonalds, and a fourth for Wendy's. Intermediary 140 intercepts the second web page 207, associates the second web page 207 with the session context, translates the second web formatted response into menu 208, and transmits the menu 208 to the client device 100. Menu 208 is displayed on the client device 100 as follows:

MENU 208
1 Burger King
2 Carl's Junior
3 McDonalds
4 Wendy's

[0037]   The reference number "3" (209) is entered on the client device 100 as a request for the McDonald's address nearest the user's home. Intermediary 140 saves the reference number "3" in the session context.

[0038]   Intermediary 140 translates the reference number "3" (209) into a response the service 152 understands by using the second web page 207. For example, intermediary 140 translates the user selected reference number "3" into a selection of the third hyperlink, which is for McDonalds, in the second web page 207. The selection of the third hyperlink 210 is communicated to a service 152. The service 152 responds with McDonald's address in web format 211. Intermediary 140 intercepts the McDonald's address in web format 211, translates McDonald's address in web format 211 into McDonald's address in text format 212, and transmits McDonald's address in text format 212 to the client device 100. If service 152 transmits the McDonald's address to intermediary 140 in text, then no translation is necessary. McDonald's address in text format 212 is displayed on the client device 100.

[0039]   At this point, intermediary 140 determines that the user's initial request in text 201 has been satisfied. The user entered three requests: the initial request in text 201, reference number "2" (205) and reference number "3" (209). The user received 3 responses – Menu 204, Menu 208, and the McDonald's address 212. The three requests and three responses involved in completing the task is an example of a session. As can be seen, maintaining session context provides session capabilities and user navigation capabilities for mobile devices communicating with asynchronous protocols.

[0040]   According to one embodiment, the user can escape from the middle of navigating a menu tree and proceed with a new request by entering an escape key. For example, if the user decides to check Oracle stock prices after requesting eating establishments but before receiving an eating establishment's address, the user can enter an escape key. Then the user can request Oracle stock prices as already described herein.

A CONTINUOUS ACTIVE CONNECTION IS NOT REQUIRED

[0041]   Unlike web applications that support sessions, a continuous active connection is not required for the duration of a "session" since asynchronous protocols are used between client device 100 and intermediary 140. For example, when a person using a mobile device, communicating with a synchronous web protocol, enters a tunnel, communications are interrupted. The connection has to be reestablished in order for the person to receive the requested information. In contrast, when a person using a client device 100, communicating with an asynchronous protocol, enters a tunnel and

communications are interrupted, the person can still receive the remaining information once the person is out of the tunnel.

HARDWARE OVERVIEW

[0042]   FIG. 3 is a block diagram that illustrates a computer system 300 upon which an embodiment of the invention may be implemented. Computer system 300 includes a bus 302 or other communication mechanism for communicating information, and a processor 304 coupled with bus 302 for processing information. Computer system 300 also includes a main memory 306, such as a random access memory (RAM) or other dynamic storage device, coupled to bus 302 for storing information and instructions to be executed by processor 304. Main memory 306 also may be used for storing temporary variables or other intermediate information during execution of instructions to be executed by processor 304. Computer system 300 further includes a read only memory (ROM) 308 or other static storage device coupled to bus 302 for storing static information and instructions for processor 304. A storage device 310, such as a magnetic disk or optical disk, is provided and coupled to bus 302 for storing information and instructions.

[0043]   Computer system 300 may be coupled via bus 302 to a display 312, such as a cathode ray tube (CRT), for displaying information to a computer user. An input device 314, including alphanumeric and other keys, is coupled to bus 302 for communicating information and command selections to processor 304. Another type of user input device is cursor control 316, such as a mouse, a trackball, or cursor direction keys for communicating direction information and command selections to processor 304 and for controlling cursor movement on display 312. This input device typically has two degrees of freedom in two axes, a first axis (e.g., x) and a second axis (e.g., y), that allows the device to specify positions in a plane.

[0044]   The invention is related to the use of computer system 300 for implementing the techniques described herein. According to one embodiment of the invention, those techniques are performed by computer system 300 in response to processor 304 executing one or more sequences of one or more instructions contained in main memory 306. Such instructions may be read into main memory 306 from another computer-readable medium, such as storage device 310. Execution of the sequences of instructions contained in main memory 306 causes processor 304 to perform the process steps described herein. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions to implement the invention. Thus,

embodiments of the invention are not limited to any specific combination of hardware circuitry and software.

[0045]   The term "computer-readable medium" as used herein refers to any medium that participates in providing instructions to processor 304 for execution. Such a medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. Non-volatile media includes, for example, optical or magnetic disks, such as storage device 310. Volatile media includes dynamic memory, such as main memory 306. Transmission media includes coaxial cables, copper wire and fiber optics, including the wires that comprise bus 302. Transmission media can also take the form of acoustic or light waves, such as those generated during radio-wave and infra-red data communications.

[0046]   Common forms of computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, or any other magnetic medium, a CD-ROM, any other optical medium, punch cards, papertape, any other physical medium with patterns of holes, a RAM, a PROM, and EPROM, a FLASH-EPROM, any other memory chip or cartridge, a carrier wave as described hereinafter, or any other medium from which a computer can read.

[0047]   Various forms of computer readable media may be involved in carrying one or more sequences of one or more instructions to processor 304 for execution. For example, the instructions may initially be carried on a magnetic disk of a remote computer. The remote computer can load the instructions into its dynamic memory and send the instructions over a telephone line using a modem. A modem local to computer system 300 can receive the data on the telephone line and use an infra-red transmitter to convert the data to an infra-red signal. An infra-red detector can receive the data carried in the infra-red signal and appropriate circuitry can place the data on bus 302. Bus 302 carries the data to main memory 306, from which processor 304 retrieves and executes the instructions. The instructions received by main memory 306 may optionally be stored on storage device 310 either before or after execution by processor 304.

[0048]   Computer system 300 also includes a communication interface 318 coupled to bus 302. Communication interface 318 provides a two-way data communication coupling to a network link 320 that is connected to a local network 322. For example, communication interface 318 may be an integrated services digital network (ISDN) card or a modem to provide a data communication connection to a corresponding type of telephone line. As another example, communication interface 318 may be a local area network (LAN) card to provide a data communication connection to a compatible LAN.

Wireless links may also be implemented. In any such implementation, communication interface 318 sends and receives electrical, electromagnetic or optical signals that carry digital data streams representing various types of information.

[0049]   Network link 320 typically provides data communication through one or more networks to other data devices. For example, network link 320 may provide a connection through local network 322 to a host computer 324 or to data equipment operated by an Internet Service Provider (ISP) 326. ISP 326 in turn provides data communication services through the world wide packet data communication network now commonly referred to as the "Internet" 328. Local network 322 and Internet 328 both use electrical, electromagnetic or optical signals that carry digital data streams. The signals through the various networks and the signals on network link 320 and through communication interface 318, which carry the digital data to and from computer system 300, are exemplary forms of carrier waves transporting the information.

[0050]   Computer system 300 can send messages and receive data, including program code, through the network(s), network link 320 and communication interface 318. In the Internet example, a server 330 might transmit a requested code for an application program through Internet 328, ISP 326, local network 322 and communication interface 318.

[0051]   The received code may be executed by processor 304 as it is received, and/or stored in storage device 310, or other non-volatile storage for later execution. In this manner, computer system 300 may obtain application code in the form of a carrier wave.

[0052]   In the foregoing specification, the invention has been described with reference to specific embodiments thereof. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader spirit and scope of the invention. The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense.

CLAIMS

What is claimed is:

1.   A method of conducting a session between a device and a service, comprising the
computer-implemented steps of:
  receiving a first message at an intermediary sent with a first protocol from a client
        device;
          wherein said first protocol does not support sessions;
  in response to said first message, said intermediary transmitting a second message
        to said service;
  receiving at said intermediary a third message that is in response to said second
        message;
  in response to said third message storing session information at said intermediary;
  transmitting a fourth message to said client device;
  receiving a fifth message from said client device at said intermediary;
  in response to said fifth message, locating said session information;
  generating a sixth message based on both content of said fifth message and said
        session information; and
  transmitting said sixth message to said service.

2.   The method of Claim 1 wherein the step of receiving at said intermediary said
third message includes the step of receiving at said intermediary said third
message that includes a menu with hyperlinks.

3.   The method of Claim 1 wherein the step of transmitting said fourth message
to said client device includes transmitting said fourth message that includes a menu with
reference numbers to said client device.

4.   The method of Claim 1 wherein a service address for said service is determined at
least in part from a to-address associated with said first message and includes the
step of determining said service address for said service at least in part from said
to-address associated with said first message.

5.   The method of Claim 4 wherein said to-address includes a site-wide-address and the step of determining said service address includes determining said service address based at least in part on said site-wide-address plus a short name that is associated with said first message.

6.   The method of Claim 4 wherein said to-address includes a service-level-address and the step of determining said service address includes determining said service address based at least in part on said service-level-address.

7.   The method of Claim 4 wherein said to-address is a telephone number and the step of determining said service address includes determining said service address based at least in part on said telephone number.

8.   The method of Claim 4 wherein an application mapping is maintained, and said application mapping includes at least one entry that maps said to-address to said intermediary that is listening for said to-address, and wherein the step of receiving said first message includes receiving said first message at said intermediary using said application mapping to determine a location of said intermediary.

9.   The method of Claim 4 wherein a service mapping is maintained, said service mapping includes at least one entry that maps said to-address to said service, and said service address is based at least in part on said entry, and wherein the step of transmitting said second message includes transmitting said second message to said service at said service address that is based at least in part on said entry.

10.   The method of Claim 4 wherein a service mapping is maintained, said service mapping includes at least one entry that maps said to-address plus a short name from said first message to said service, and said service address is based at least in part on said entry, and wherein the step of transmitting said second message includes transmitting said second message to said service at said service address that is based at least in part on said entry.

11.   The method of Claim 1 wherein said first message includes an instruction and the step of transmitting said second message to said service includes creating said second message that indicates said instruction.

12.   The method of Claim 1 wherein the step of receiving said first message is
      performed by a protocol handler and further includes the steps of:
      extracting a to-address and an instruction from said first message;
      determining an address of said intermediary based at least in part on said to-
            address; and
      transmitting said to-address and said instruction to said intermediary.

13.   The method of Claim 12 wherein said protocol handler is an e-mail protocol
      handler and the step of extracting is performed by said e-mail protocol handler.

14   The method of Claim 12 wherein said protocol handler is an SMS protocol
      handler and the step of extracting is performed by said SMS protocol handler.

15.   The method of Claim 1 wherein said second message is transmitted with HTTP.

16.   The method of Claim 1 wherein said second message is transmitted with a Java
      API.

17.   The method of Claim 1 wherein the step of transmitting said second message to
      said service is performed at an Internet Service Provider.

18.   The method of Claim 1 wherein the step of storing session information includes
      the step of maintaining a session context that includes reference numbers that a
      user selected from a menu.

19.   The method of Claim 18 wherein said session context is maintained in a state
      machine and the step of maintaining includes maintaining said session context in
      said state machine.

20.   The method of Claim 1 wherein said third message is associated with said session
      information and the step of storing includes associating said third message with
      said session information.

21. The method of Claim 1 wherein a device ID of said device is used to determine when a session starts, and wherein the step of receiving said first message at said intermediary includes starting said session the first time said intermediary detects said device ID that is associated with said first message.

22. The method of Claim 1 wherein a timer is used to determine when a session ends and further includes the step of ending said session when said timer ends.

23. The method of Claim 1 wherein a session ends at the earliest of a timer ending or a user exiting a menu tree and further includes the step of ending said session at the earliest of said timer ending or said user exiting said menu tree.

24. The method of Claim 1 wherein the step of receiving at said intermediary said third message includes receiving at said intermediary said third message in Oracle's mobile XML™.

25. A computer-readable medium carrying one or more sequences of instructions for conducting a session between a device and a service, wherein execution of the one or more sequences of instructions by one or more processors causes the one or more processors to perform the steps of:

   receiving a first message at an intermediary sent with a first protocol from a client device;
      wherein said first protocol does not support sessions;
   in response to said first message, said intermediary transmitting a second message to said service;
   receiving at said intermediary a third message that is in response to said second message;
   in response to said third message storing session information at said intermediary;
   transmitting a fourth message to said client device;
   receiving a fifth message from said client device at said intermediary;
   in response to said fifth message, locating said session information;
   generating a sixth message based on both content of said fifth message and said session information; and
   transmitting said sixth message to said service.

26.　The computer-readable medium of Claim 25 wherein the step of receiving at said intermediary said third message includes the step of receiving at said intermediary said third message that includes a menu with hyperlinks.

27.　The computer-readable medium of Claim 25 wherein the step of transmitting said fourth message to said client device includes transmitting said fourth message that includes a menu with reference numbers to said client device.

28.　The computer-readable medium of Claim 25 wherein a service address for said service is determined at least in part from a to-address associated with said first message and includes the step of determining said service address for said service at least in part from said to-address associated with said first message.

29.　The computer-readable medium of Claim 28 wherein said to-address includes a site-wide-address and the step of determining said service address includes determining said service address based at least in part on said site-wide-address plus a short name that is associated with said first message.

30.　The computer-readable medium of Claim 28 wherein said to-address includes a service-level-address and the step of determining said service address includes determining said service address based at least in part on said service-level-address.

31.　The computer-readable medium of Claim 28 wherein said to-address is a telephone number and the step of determining said service address includes determining said service address based at least in part on said telephone number.

32.　The computer-readable medium of Claim 28 wherein an application mapping is maintained, and said application mapping includes at least one entry that maps said to-address to said intermediary that is listening for said to-address, and wherein the step of receiving said first message includes receiving said first message at said intermediary using said application mapping to determine a location of said intermediary.

33. The computer-readable medium of Claim 28 wherein a service mapping is maintained, said service mapping includes at least one entry that maps said to-address to said service, and said service address is based at least in part on said entry, and wherein the step of transmitting said second message includes transmitting said second message to said service at said service address that is based at least in part on said entry.

34. The computer-readable medium of Claim 28 wherein a service mapping is maintained, said service mapping includes at least one entry that maps said to-address plus a short name from said first message to said service, and said service address is based at least in part on said entry, and wherein the step of transmitting said second message includes transmitting said second message to said service at said service address that is based at least in part on said entry.

35. The computer-readable medium of Claim 25 wherein said first message includes an instruction and the step of transmitting said second message to said service includes creating said second message that indicates said instruction.

36. The computer-readable medium of Claim 25 wherein the step of receiving said first message is performed by a protocol handler and further includes the steps of:
extracting a to-address and an instruction from said first message;
determining an address of said intermediary based at least in part on said to-address; and
transmitting said to-address and said instruction to said intermediary.

37. The computer-readable medium of Claim 36 wherein said protocol handler is an e-mail protocol handler and the step of extracting is performed by said e-mail protocol handler.

38 The computer-readable medium of Claim 36 wherein said protocol handler is an SMS protocol handler and the step of extracting is performed by said SMS protocol handler.

39. The computer-readable medium of Claim 25 wherein said second message is transmitted with HTTP.

40.   The computer-readable medium of Claim 25 wherein said second message is transmitted with a Java API.

41.   The computer-readable medium of Claim 25 wherein the step of transmitting said second message to said service is performed at an Internet Service Provider.

42.   The computer-readable medium of Claim 25 further comprising the step of maintaining a session context that includes reference numbers that a user selected from a menu.

43.   The computer-readable medium of Claim 42 wherein said session context is maintained in a state machine and the step of maintaining includes maintaining said session context in said state machine.

44.   The computer-readable medium of Claim 25 wherein said third message is associated with said session information and the step of storing includes associating said third message with said session information.

45.   The computer-readable medium of Claim 25 wherein a device ID of said device is used to determine when a session starts, and wherein the step of receiving said first message at said intermediary includes starting said session the first time said intermediary detects said device ID that is associated with said first message.

46.   The computer-readable medium of Claim 25 wherein a timer is used to determine when a session ends and further includes the step of ending said session when said timer ends.

47.   The computer-readable medium of Claim 25 wherein a session ends at the earliest of a timer ending or a user exiting a menu tree and further includes the step of ending said session at the earliest of said timer ending or said user exiting said menu tree.

48.   The computer-readable medium of Claim 25 wherein the step of receiving at said intermediary said third message includes receiving at said intermediary said third message in Oracle's mobile XML™.
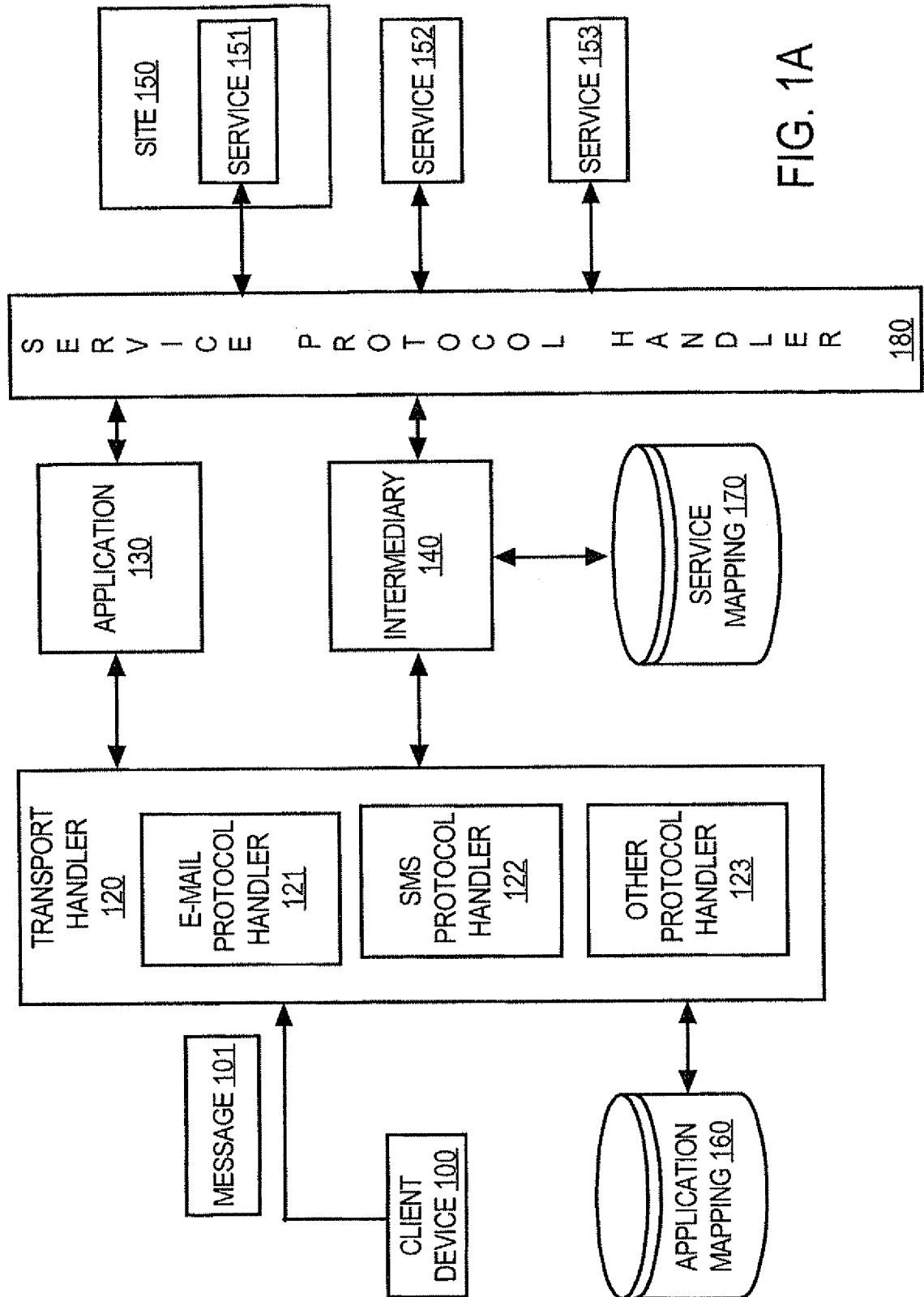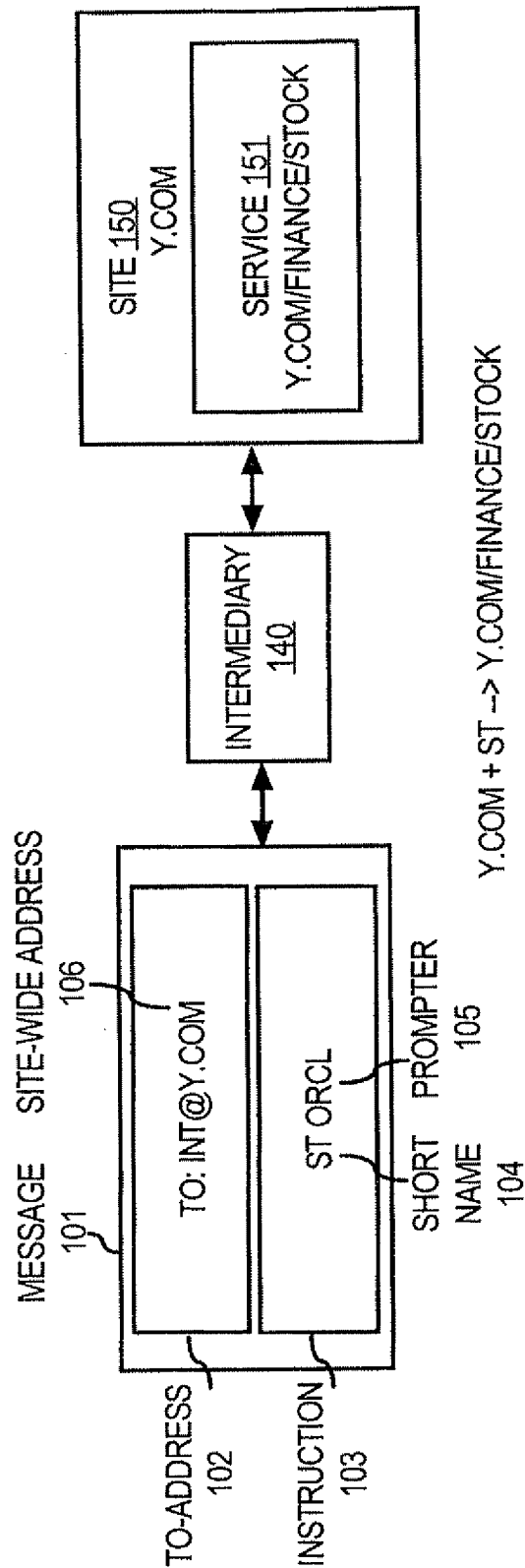
1/6

FIG. 1A

FIG. 1B

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FIG. 1C

FIG. 1D

SERVICE 152

INITIAL REQUEST IN WEB FORMAT 202

FIRST WEB PAGE 203

SECOND HYPERLINK IN FIRST WEB PAGE 206

SECOND WEB PAGE 207

THIRD HYPERLINK IN SECOND WEB PAGE 210

McDONALD'S ADDRESS IN WEB FORMAT 211

INTERMEDIARY 140

INITIAL REQUEST IN TEXT 201

MENU 204

REFERENCE NUMBER "2" 205

MENU 208

REFERENCE NUMBER "3" 209
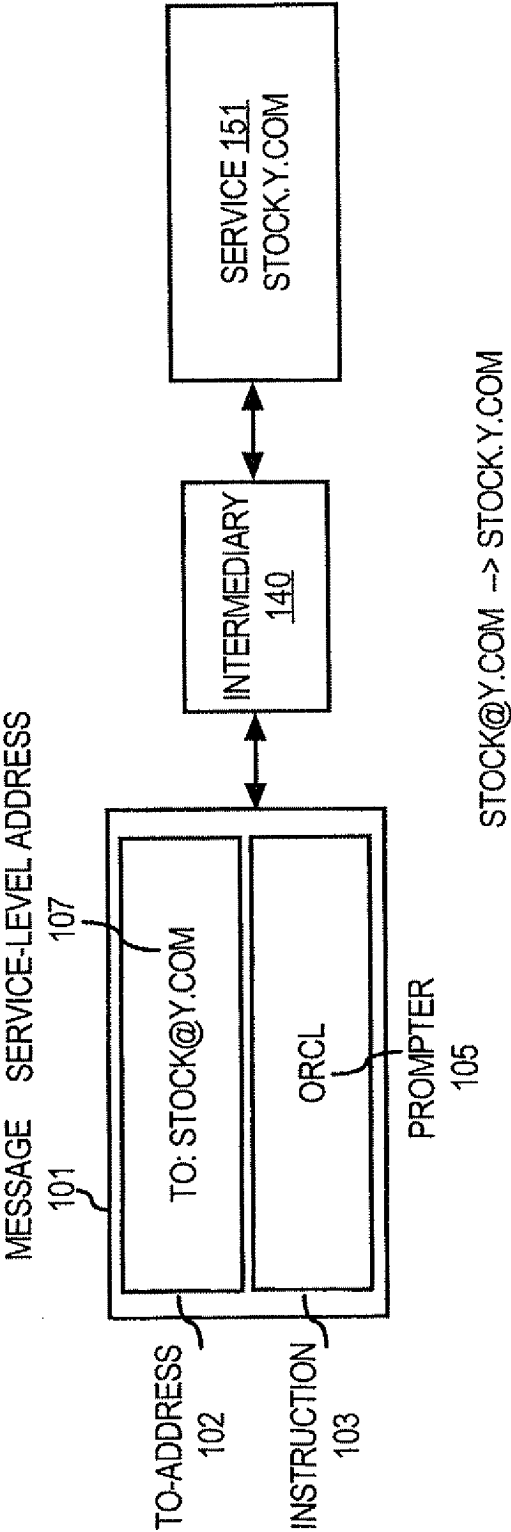
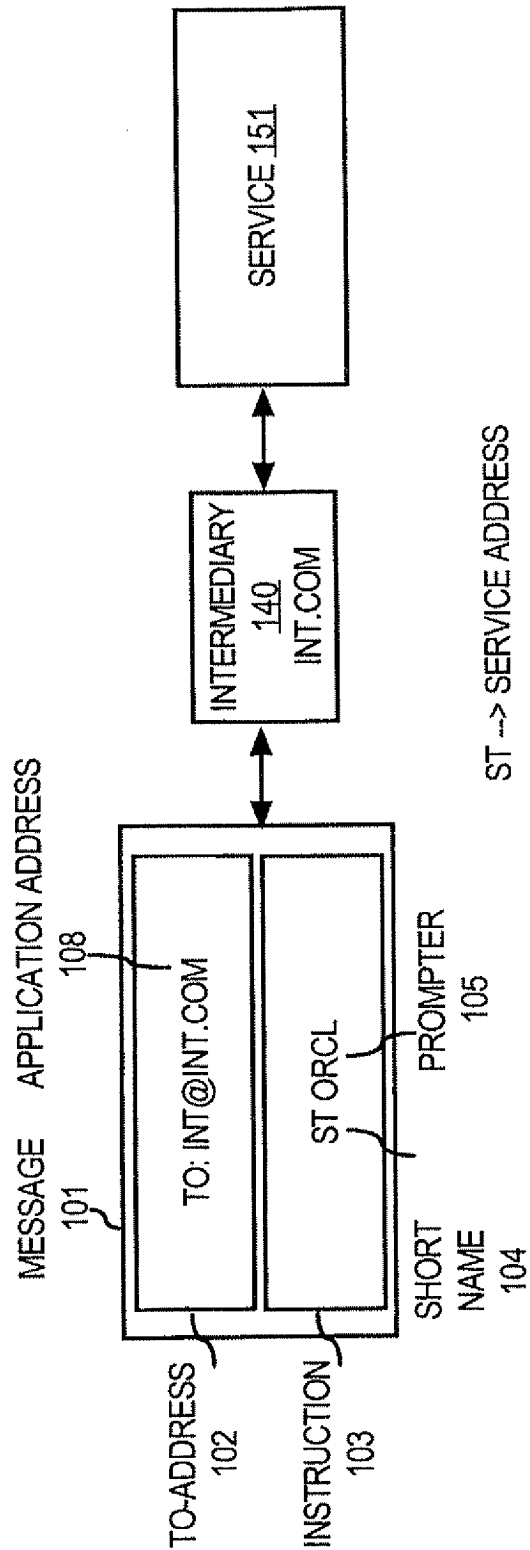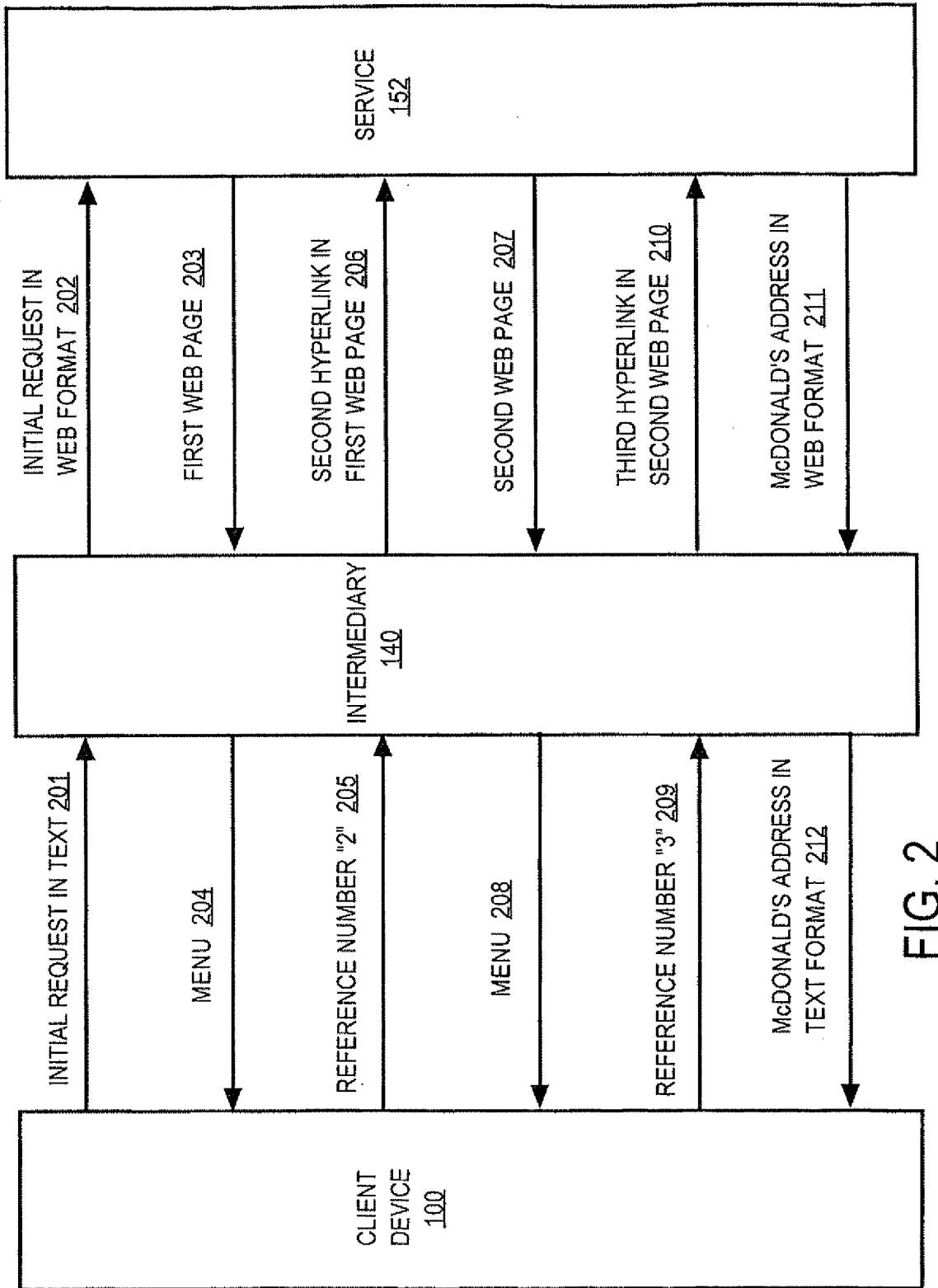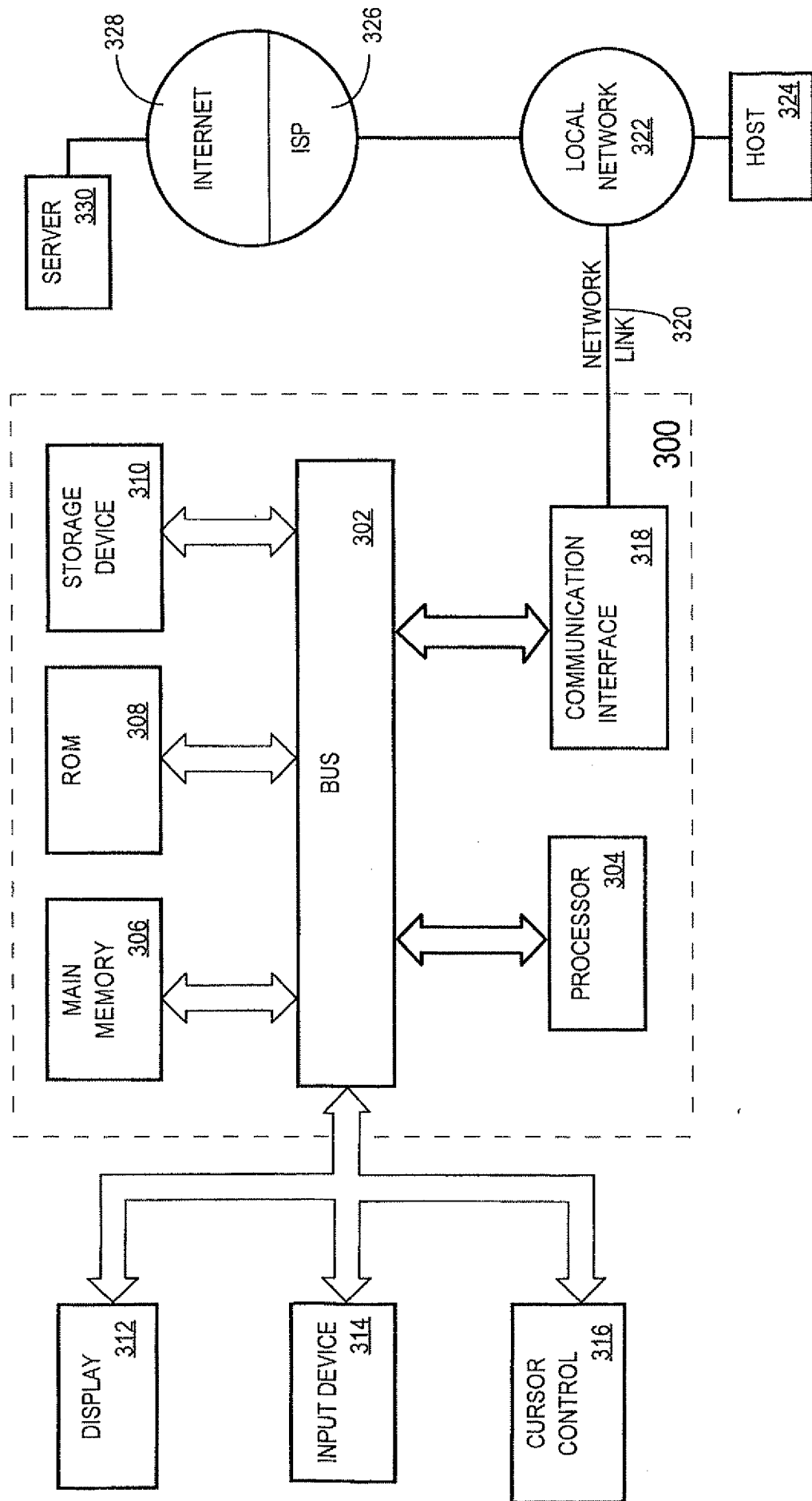McDONALD'S ADDRESS IN TEXT FORMAT 212

CLIENT DEVICE 100

FIG. 2

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FIG. 3

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H04L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01 84804 A (BULLETIN NET INC) 8 November 2001 (2001-11-08) page 1, line 10 -page 3, line 19 page 4, line 11 - line 25 page 5, line 21 -page 7, line 8 page 8, line 2 - line 22 page 9, line 8 - line 11 page 10, line 3 -page 11, line 15 page 14, line 3 - line 16 page 16, line 12 -page 19, line 7 page 22, line 7 -page 24, line 7 ---- -/--	1-48

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 February 2003	03/03/2003

| Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016 | Authorized officer Kesting, V |

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01 84868 A (NOKIA NETWORKS OY ;TUOMAINEN PETRI (FI)) 8 November 2001 (2001-11-08) abstract page 1, line 4 - line 23 page 2, line 1 - line 25 page 3, line 1 -page 4, line 22 page 6, line 13 -page 8, line 31 figure 2B	1-3,11, 12,14, 15, 17-21, 24-27, 35,36, 38,39, 41-45,48
P,X	EP 1 168 766 A (COMVERSE NETWORK SYSTEMS LTD) 2 January 2002 (2002-01-02) abstract paragraph '0034! - paragraph '0057! paragraph '0061! - paragraph '0072! paragraph '0084! - paragraph '0085! paragraph '0088! figure 7	1-12,14, 15,17, 18,20, 21, 24-36, 38,39, 41,42, 44,45,48
A	EP 1 001 578 A (CITIBANK NA) 17 May 2000 (2000-05-17) abstract paragraph '0002! paragraph '0007! paragraph '0011! - paragraph '0016! paragraph '0020! paragraph '0022! - paragraph '0024! paragraph '0026! paragraph '0028! - paragraph '0033! --/--	1,2,4-6, 11,13, 17,20, 25,26, 28-30, 35,37, 41,44

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 091 607 A (PHONE COM INC) 11 April 2001 (2001-04-11) abstract paragraph '0006! - paragraph '0007! paragraph '0015! paragraph '0017! - paragraph '0020! paragraph '0030! - paragraph '0031! paragraph '0034! - paragraph '0040!	11,12, 14,15, 17,21, 24,35, 36,38, 39,41, 45,48
A	WO 99 23557 A (ORACLE CORP) 14 May 1999 (1999-05-14) page 9, line 24 - line 28 page 18, line 10 -page 19, line 3 page 36, line 21 - line 33 claim 11	16,22, 23,40, 46,47

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 0184804	A	08-11-2001	AU	5936101 A	12-11-2001
			WO	0184804 A2	08-11-2001
			US	2002083035 A1	27-06-2002
WO 0184868	A	08-11-2001	FI	20001042 A	05-11-2001
			AU	5845801 A	12-11-2001
			WO	0184868 A1	08-11-2001
EP 1168766	A	02-01-2002	CN	1343055 A	03-04-2002
			EP	1168766 A2	02-01-2002
EP 1001578	A	17-05-2000	AU	720645 B2	08-06-2000
			AU	5260099 A	06-04-2000
			EP	1001578 A2	17-05-2000
EP 1091607	A	11-04-2001	CN	1291853 A	18-04-2001
			EP	1091607 A2	11-04-2001
			JP	2001188743 A	10-07-2001
WO 9923557	A	14-05-1999	US	6334114 B1	25-12-2001
			AU	742797 B2	10-01-2002
			AU	1280199 A	24-05-1999
			CA	2308801 A1	14-05-1999
			DE	69810654 D1	13-02-2003
			EP	1025497 A1	09-08-2000
			JP	2001522086 T	13-11-2001
			WO	9923557 A1	14-05-1999